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DATAMATION 85

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DP SALARIES IN THE DOLDRUMS

ALSO

CAN AI SAVE COBOL?

BUILDING A 4GL ENVIRONMENT

HOW TO RECOGNIZE GOOD SYSTEMS DESIGNERS

DATAMATION

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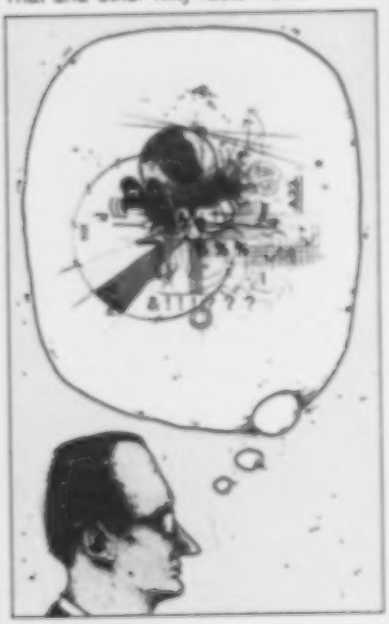

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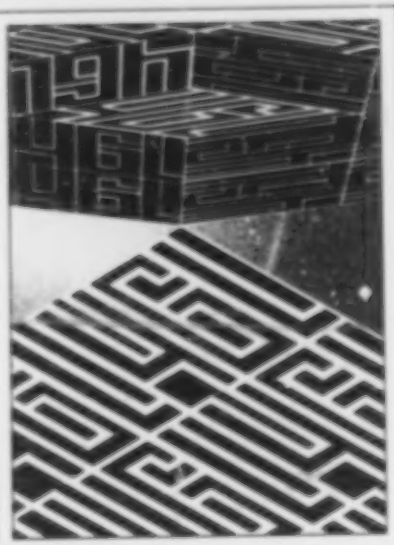

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COVER ILLUSTRATION BY RICHARD EGIELSKI

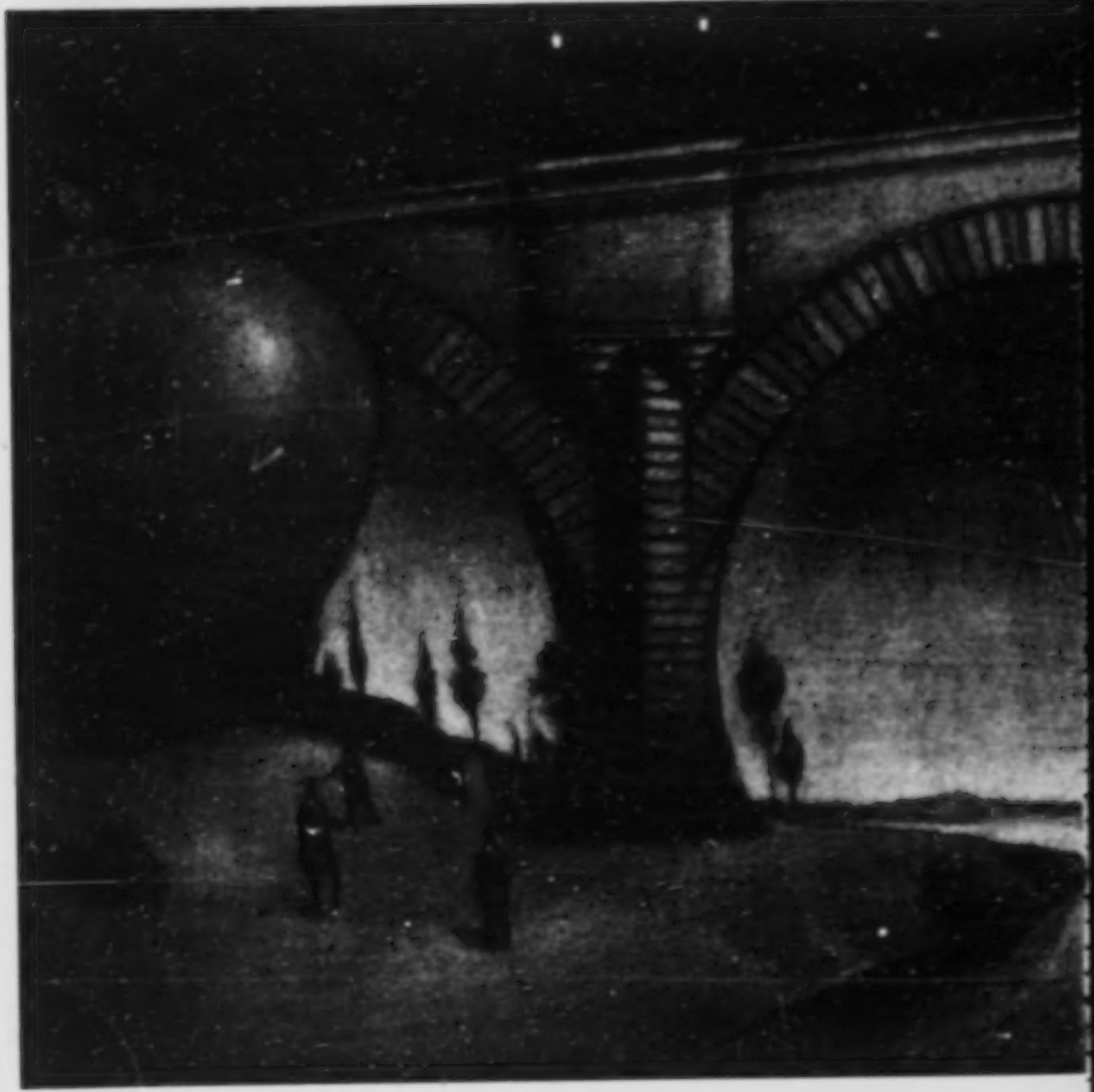
Products that link old and new office systems may be worth $1.5 billion by 1990.

BRIDGING THE GAP

by Edith Holmes

Over the past two years, office automation has become synonymous with personal computers tied to word processing systems, minicomputers, and mainframes. Users seeking to make the productivity promises of OA come true are beginning to put a premium on links between pieces of hardware made by different manufacturers. Indeed, "among the challenges facing users in 1985 is document distribution across incompatible machines," says Dale Kutnick, an industry consultant based in Wayland, Mass.

Fortune 1,000 companies have de-



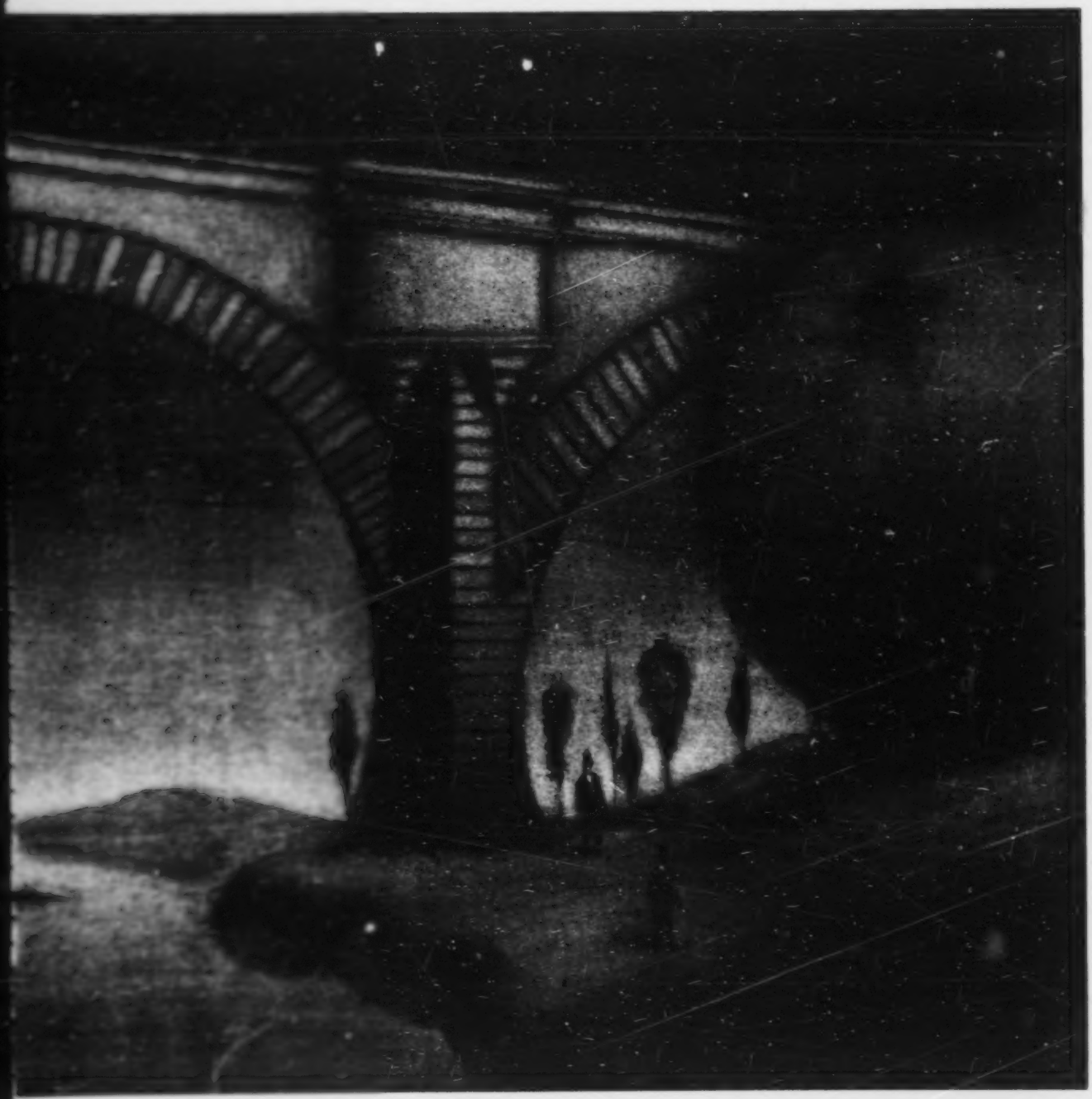
manded technology that will mix and match such products as Wang Office, Digital Equipment Corp.'s All-in-1, Data General's CEO, Hewlett-Packard's Desk Manager, and IBM PCs running MultiMate or DisplayWrite, moving documents as well as messages from one machine to another. The new gear will tie the old office with its word processing gear to the new office dominated by micro and departmental computers and dependent on the corporate data center.

Throughout the year, so-called "bridge systems" providing connections to the IBM environment have been introduced or promised from relatively young software houses, established mini makers, and such new entrants to the computer field as AT&T Information Systems. A few bridges are up and running, but in most cases they are still experimental (see box).

Certainly, protocol converters have been around for a long time, and—broadly defined—the bridge industry must be said to include these devices. But other hardware-based solutions to the document distribution problem in the office are gaining acceptance. Two-year-old Banyon Systems Inc. of Westboro, Mass., for instance, is marketing a network server that has at its core what the company calls a virtual networking system architecture.

Banyon's server—with a 32-bit processor, up to eight megabytes of main memory, a six-slot I/O bus, as many as four 43-megabyte Winchester disk drives, a cartridge tape drive, a cartridge tape drive for backup, battery backup, and storage expansion capability—accommodates multiple, mixed communications network cards linking a variety of personal computers via different local area networks, including Xerox's Ethernet, Corvus Systems' Omninet, IBM's PC Network, and Proteon Associates' ProNet. In addition to permitting

ILLUSTRATION BY DAN ADEL



"Among the challenges facing users in 1985 is document distribution across incompatible machines."

transparent, multi-user file sharing among dissimilar pcs and workstations, mainframes, and databases, the firm offers a mail feature that connects pc users to local, host-based, and public message systems.

TAKING A DIFFERENT APPROACH

Keyword Office Technologies, founded in 1979 and headquartered in Calgary, Alberta, has taken a different approach with its Keyword 7000 disk-to-disk document conversion system. A peripheral hardware device driven by an IBM or compatible computer and introduced by the firm last year, the Keyword 7000 can translate documents among word processing systems made by Lanier, AES, IBM, Wang, Xerox, DEC, NBI, and others. Last March, the company added document exchange software modules for the IBM DisplayWrite II word processing package and the IBM 5520 administrative system to its growing library of Keyword 7000 connections. And in July, Keyword unveiled a software package called COM.FILE that lets users of its disk-to-disk conversion system translate documents for transmission to remote, previously incompatible word processing systems.

Though these hardware solutions appeal to many users, analysts anticipate that between 75% and 85% of the bridge business will be made up of software products from such companies as Soft-Switch Inc. of King of Prussia, Pa., and Software Research Corp. in Natick, Mass. All told, this new industry is worth between $150 million and $200 million today. "It will hit $1 billion sometime in 1988 and reach $1.5 billion by the end of the decade," predicts George Colony, president of Forrester Research Inc. in Cambridge, Mass.

Colony and others believe that the bridge business will prove to be "an excellent niche market" for relatively new firms like Soft-Switch and SRC. Accordingly, they are recommending investment in bridge companies. But at the same time, market researchers suggest that no one in the computer field can afford to ignore these connections in the office. "Everyone—from IBM and AT&T to the mini makers—will want to get into this," says Kutnick. The question is whether the third parties in this field can successfully oem their solutions to these manufacturers, in addition to selling directly to end users.

Bridge products, particularly those from third parties, received a boost nearly a year ago when IBM unveiled its long-range office systems scheme with the Distributed Office Support System (DISOSS) at its heart. DISOSS, a host program that runs under IBM's CICS and MVS or DOS VSE, implements IBM's Document Interchange Architecture (DIA) to provide library, distribution, and application services. It is a "strategic" product for the company, says an IBM spokesman. Grateful for the sudden awareness that Big Blue's action has given his industry, Soft-Switch president and ceo Michael Zisman notes that "IBM is marketing DISOSS as aggressively as it has ever marketed any software product."

IBM's commitment to and positioning of DISOSS begins to make office links to the industry leader's environment possible by setting a de facto standard, and "raises the stakes for the mini vendors," says analyst Kutnick. "They must tie into it." No longer is the 3270 dumb terminal link between the office and the IBM-oriented data center sufficient, he suggests. Personal computers and intelligent workstations that can initiate sessions and exchange files with the mainframe or a departmental processor are the order of the day. "If you can't look like IBM in the office, you can't succeed," adds Amy D. Wohl of Wohl & Associates in Bala Cynwyd, Pa.

OA and mini suppliers acknowledge the need to provide a connection to the IBM world. "We view IBM as our major competitor in the office," says Gerry Paul, vice president of communications systems development at Wang. "Our focus is on IBM coexistence." Joe Forgione, marketing manager for communications products in Data General's Information Systems Division, agrees. "We must coexist with IBM," he says. "We're doing everything we possibly can to work with IBM mainframes."

600-700 DISOSS USERS

Estimates put the number of DISOSS users worldwide between 600 and 700; approximately 450 of these users are in the United States, agree Wohl and Kutnick. They anticipate that users will continue to test DISOSS for the next nine to 10 months and that it will enter the "mainstream" in data processing shops in 1986 or 1987 and become a user-transparent standard by 1988. In the meantime, Kutnick believes that there is "lots of room for third parties" to develop gateways to DISOSS using IBM's high-level SNA Logical Unit (LU) 6.2 program-to-program protocol and SNA Distribution Services, a distribution architecture first implemented in DISOSS 3.2.

Also responsible for the rising interest in bridge products is the current push toward departmental processors, says Zisman of Soft-Switch. Here, he suggests, the mini makers are the leaders because of the work they have done on communications architectures. Though he believes that IBM's System/36—now labeled by the company as its "general purpose departmental system with broad office function"—will increase Big Blue's market share at the office level, Zisman sees DEC, Data General, Hewlett-Packard, and even Wang stealing the march from IBM for the moment in this environment. Indeed, a Yankee Group study earlier this year shows DEC's All-in-1 office automation package leading IBM's

BRIDGES AT WORK

The breakup of the Bell System and the dawn of competition in communications has forced suppliers in the industry to offer better prices to their customers and thus to narrow their own operating margins. This holds true whether the company is AT&T or MCI or GTE.

At GTE Data Services (GTEDS), headquartered in Tampa, Fla., efficiency is the watchword. "Anything that we can do to reduce costs for the GTE telephone companies, we'll do," says Harry Barker, systems engineer with Information Sciences, the research organization within GTEDS.

Barker heads a project charged with a major cost reduction effort: the creation of a nationwide office automation network for GTEDS, a service firm whose major customers are the telephone operating companies ons scattered across the country. With such a network, GTEDS hopes to speed document and electronic mail delivery among the eight major computer centers that serve the phone companies. Ultimately, Barker anticipates, a system still in the experimental stage at GTEDS will become the basis for "a true corporate data net at GTE."

The foundation for GTEDS's test network is IBM's SNA Distribution Services (SNADS) and Distributed Office Support System (DISOSS). By the end of this year, Barker expects four or five of his company's data centers to be lashed together via SNADS and exchanging mail with DISOSS. Largely equipped with multiple IBM 308X and compatible processors, these computer operations include centers located in Tampa; Fort Wayne, Ind.; Erie, Pa.; Durham, N.C.; and Everett, Wash.

"When we talk about tying the whole office automation kludge together, we're dealing with far more than a local area network," says Barker. "We need to create a corporate repository for information; we need a host-based system."

GTEDS has finished installing and testing DISOSS 3.2—IBM's first implemen-

tation of DISOSS-to-DISOSS, peer-to-peer document exchange—at four of its centers. The company will be testing initial DISOSS-to-DISOSS, host-to-host document exchange in the fourth quarter of 1985. The next step is data center to data center exchange.

In addition, Barker's project is working to tie IBM DisplayWriters, office department processors in the System/36 class, 3270-type terminals, pcs, and host printers to the mainframes at each center. It will follow up by connecting Wang VS systems, the several types of IBM PCs and compatibles such as Compaq running MultiMate and DisplayWrite II word processing packages. Says Barker, "Sooner or later, Apple's Macintosh will probably become a real player in our network. We have quite a few Macs around to do graphics tasks."

To link most of its non-Blue equipment to the office automation network, GTEDS is using bridge software from Soft-Switch Inc. of King of Prussia, Pa. Soft-Switch packages are in place in two sites that have non-IBM gear—Tampa and Fort Wayne.

"We scoured the marketplace, looking for anything that would hook up our different machines," Barker recalls. "We considered hardware-based solutions," such as the disk conversion system offered by Keyword Office Technologies of Calgary, Alberta. "These products probably have a place at GTE. But for now, we want to be able to integrate our solution in a network," he explains.

GTEDS found there weren't many companies capable of offering the range of translation options, the "document fidelity" that Soft-Switch provides. Also, in business for awhile, the software house "is well established," says Barker. "We're always looking for stability" in suppliers.

Finally, Soft-Switch's approach to the problem of interconnecting devices made by different manufacturers happened to coincide with GTEDS's philosophy on this particular subject. Both supplier and end user believe in tying their office automation systems to mainframes that can provide the computing power for complex translations and large databases.

But even Soft-Switch didn't pass muster when Barker's group first considered its products. "When they incorporated mail into their document control system, tying their distribution system to the DISOSS distribution system, [then] Soft-Switch offered what we needed," he notes.

And the product has not been without glitches. When GTEDS implemented Soft-Switch's DISOSS bridge, "we found we couldn't exchange documents with DISOSS PC, IBM's 3270 terminal software, because it only works with final form documents," says Barker. "Soft-Switch's package only worked with revisable documents." The Pennsylvania firm immediately began work on a final form translator to solve the document exchange problem.

GTED's early efforts in developing an office automation network were funded from R&D money, including the initial Soft-Switch installation in Tampa. Although the company's actual costs are unavailable, Barker expects a large portion of the expense of any bridging installation will consist of the cost of translator software.

He cautions other end users that deciding whether to buy multiple translators requires considerable justification.

In Tampa, GTEDS has only one Wang VS system—hardly the equipment population normally needed to justify spending the money for a link into DISOSS. But it happens that the Wang gear is the basis for a large printing operation at GTEDS headquarters that includes system documentation for the data centers. Ultimately, the GTE unit hopes to generate savings from its office automation network by using it to distribute documentation to its computer operations and telephone company users.

BARKER OF GTEDS: A corporate repository for information requries a host-based OA system.

Whether GTEDS will continue to buy products from Soft-Switch, develop links itself, or look to the hardware manufacturers for connections in the office is an open question. Periodically, Soft-Switch has asked GTEDS to beta test newly developed interfaces, and GTEDS has done so for several packages.

GTEDS' Information Sciences group is doing some prototype work of its own, developing a software gateway for applications outside the document exchange environment that will permit users to enter output from data processing applications into the document distribution system for delivery. Here, Soft-Switch is working closely with GTEDS to create this interface.

In the meantime, "many of the [hardware] vendors are popping new link products out of the hopper right now," says Barker. "Some of them may offer what Soft-Switch does today."

—E.H.

Professional Office Systems (PROFS) in installations this year. Links to DISOSS would only enhance the standing of the mini vendors' office systems (see Fig. 1).

There are currently only a handful of companies offering software to connect the machines of differing manufacturers. Soft-Switch is perhaps the best known and the largest of the third-party software houses building bridge products today. Founded by Zisman in 1979, the company's product's center around a document control system running on an IBM host under MVS or VM. The system provides document interchange—including translation, distribution, and library services—for a variety of word processors, personal computers, and IBM host-based terminals. Beyond IBM, the vendors whose machines Soft-Switch accommodates include Wang, Xerox, and NBI. The company also supports MultiMate and DisplayWrite II.

First offering support for IBM's Document Content Architecture (DCA) in 1983, Soft-Switch extended its product line last year to incorporate IBM's DIA and to provide a PROFS connection. The new PROFS software transfers documents in revisable form between PROFS users and other Soft-Switch users. Earlier this year, Soft-Switch introduced its DISOSS connection, followed by an enhancement to the PROFS link, permitting the exchange of messages

FIG. 1

U.S. OA PACKAGE INSTALLATION FORECAST

(1983 through 1989)

VENDOR	1983	1984	1985	1986	1987	1988	1989	AGGREGATE CHANGE (%)
IBM PROFS/PS	250	650	4,000	11,900	23,250	38,700	52,250	143.6
IBM DOSF	500	1,400	2,800	4,675	6,000	5,375	5,500	49.1
DEC All-in-1	400	1,200	4,400	10,625	20,610	32,250	44,000	118.9
Wang Office	500	1,500	3,800	7,650	12,750	17,200	22,000	87.9
Data General CEO	200	1,000	3,000	6,800	12,750	19,350	24,750	123.2
Hewlett-Packard	250	750	2,600	6,375	13,500	20,425	27,500	118.9
Datapoint	400	850	2,160	4,165	6,450	8,815	11,000	73.7
Four-Phase	200	325	800	1,700	3,000	4,300	5,500	73.7
Sperry	100	250	640	1,275	2,250	3,225	4,125	85.9
Honeywell	100	250	640	1,275	2,250	3,225	4,125	85.9
Prime	50	175	560	1,360	3,000	5,160	6,875	127.2
In-House	500	1,100	2,600	4,250	6,750	7,525	6,875	54.8
Other	1,500	4,500	12,000	22,950	37,500	49,450	60,500	85.2
TOTAL	4,950	13,950	40,000	85,000	150,000	215,000	275,000	95.3%
ANNUAL CHANGE		181.8%	186.7%	112.5%	76.5%	43.3%	27.9%	

Source: the Yankee Group, February 1985

and final form as well as revisable documents. The company also now supports All-in-1. This month, Soft-Switch plans to ship an integrated version of its products and transNET, an SNA-based document interchange system developed by Austin, Texas-based Network Applications Inc., a competitor in the bridge business acquired in May by Soft-Switch.

End users typically pay $49,000 in licensing fees for an introductory set of Soft-Switch modules. The firm has reached oem deals for prices ranging from $150,000 to $750,000, says Donald Fisher, director of oem sales. Soft-Switch has more than 60 end users and half a dozen oems. Its products are also being used by value-added networks, such as Unicall, a U.S. subsidiary of the French Compagnie Internationale de Services en Informatique. Further, they are being marketed in the United Kingdom under a joint marketing agreement with Soft-Switch Ltd.

COURTING SOME NEW CLIENTS

Just one year old, Soft-Switch's oem operation is actively courting new clients, says Fisher. "We're talking with some OA vendors about how they can successfully meet the requirement to provide DISOSS compatibility." Soft-Switch already counts Wang and Tandem among its oems. Wang introduced a DISOSS link for its Wang Office in April, as well as a PROFS gateway for Wang VS, and a Wang VS/SNA gateway. The firm depended, in part, on translator technology licensed from Soft-Switch, says Paul. The software house is also working closely with AT&T to develop a DISOSS interface to the Unix operating system. Its version will be delivered to AT&T before the end of the year, says Zisman. "Unix," he adds, "is clearly going to be important in the office."

Going head-to-head with Soft-Switch for the bridge business and scheduled to introduce a global network software product this month is Software Research Corp. Two banks in New York and Boston and two Boston-based insurance companies are currently pilot testing what SRC calls the Strategic Network Environment, or SNE. This bridge provides network file transfer software that enables users to move data among DEC VMS computers, IBM mainframes running MVS, Wang VS machines, and IBM-compatible personal computers. "By the beginning of the year, we will support IBM VM and Wang OIS," says Mike Valvo, SRC's manager of sales support. "Ultimately, we expect to support Data General and Hewlett-Packard. We want to support as many machines out there as possible."

Described as an "architecturally based solution," SNE is intended to be consistent with all existing architectures, Valvo explains. "SNE floats on top of them, extending them, complementing what is already there." A copy of SNE resides in every machine, and devices talk to each other through its high-level protocol. Users can request SNE in an on-line session or during a batch job. It will provide interfaces to a variety of database management systems and will handle electronic messages.

The first two products in the SNE software family will be the Base Module, which performs and administers the exchange of information, and the File Transfer Module, which allows files to be exchanged between dissimilar computers operating different applications. Prices are still being set, but the company anticipates, for example, that it will charge $17,000 per mainframe for the host-to-host MVS file transfer portion of SNE.

SRC plans to market its new product directly to corporations worldwide and to oem vendors. The firm has yet to sign any SNE oems. "We're in the process of talking to them," notes Carol Mazuy, director of corporate communications and marketing services. "One of the reasons we've decided to go with a direct sales force is to entice oem vendors by selling to end users first." SRC expects to have 30 end-user installations up and running with SNE by the end of the first quarter of 1986.

Until now, all of SRC's sales have been to oems. Founded in 1978 as a consulting service company with particular expertise in IBM technology, SRC delivered its first bridge product earlier this year. Dubbed Docupower, this software package is a DISOSS bridge that links computers made by AT&T, Burroughs, Datapoint, DEC, Harris, Honeywell, NBI, and Wang to IBM's office support software. The bridge extends DISOSS to the machines of Atlanta-based Lanier Business Products Inc. and other terminals as well.

Four-Phase Systems Inc. in Cupertino, Calif., and Lanier are among Docupower's oems. Four-Phase, a subsidiary of Motorola Inc., introduced a DISOSS link for Motorola 4000/5000 minicomputers last June. Its TransText software bridge is based, in part, on Docupower. "Some of our oems and others view Docupower as an interim solution on the way to SNE," says Mazuy.

OTHER COMPANIES ENTER TOO

While SRC and Soft-Switch offer the most comprehensive software solutions, other companies have entered this end of the bridge business and are attracting major oem customers. Though Soft-Switch is building AT&T's DISOSS link, for instance, System Strategies Inc. of New York wrote the SNA and bisynchronous 3270 emulator programs and the 3270 application program interface that AT&T announced in June to

Between 75% and 85% of the bridge business will be made up of software products.

link its 3B mini line to IBM mainframes.

Among the other bridge companies that bear watching are Communications Solutions Inc. of San Jose and Systems Center Inc. in Dallas. In operation for six years, CSI has built its reputation among computer manufacturers with 3270 emulation packages. It has some 80 oem customers for these products, including AT&T, NBI, NCR, and Tandem, says Donald Czubek, vice president of the firm. This month, CSI will begin shipping two products introduced in June and aimed at IBM's office environment. Access/SNA APPC emulates IBM's Advanced Program-to-Program protocol (LU 6.2) to allow application programs to communicate with one another. Access/DIA lets workstation products perform office functions compatible with IBM's DIA. "Unlike our competitors who use mainframe-based software, our approach," explains Czubek, "is to make the workstation DISOSS-compatible. In the long run, we don't believe hardware manufacturers are going to need that mainframe software." CSI's new programs will sell for $350 each in quantities of 500.

Another group of software houses has yet to offer DISOSS links but provides file transfer products for the IBM SNA environment. Four-year-old Systems Center is one such company. Its Network DataMover competes with such products as IBM's own Bulk Data Transfer and OnLine Systems Inc.'s Telefile. At the head of the family is Network DataMover-MVS, which operates on IBM mainframes under the MVS operating system. A Network DataMover-PC program runs on IBM PCs and compatibles to provide micro-to-mainframe data transfer. Among the connections Systems Center supports are an IRMA coax attachment via an IBM 3274 controller and the Corvus Systems Omninet LAN using the Omninet-SNA gateway.

PAUL OF WANG: "Our focus is on IBM coexistence."

The fledgling bridge industry has yet to be invaded by major software houses like Cullinet Software of Westwood, Mass. "We're considering a link of our own between our Information Center Management System [ICMS] software and IBM's DISOSS," says Eugene Kaplan, product manager for systems development at Cullinet. "We realize the importance of DISOSS, but we're not 100% committed to it yet." DISOSS probably will be incorporated in a future release of ICMS. Meanwhile, Cullinet has agreements with Data General, DEC, Wang, and Hewlett-Packard to create products linking their office automation systems to ICMS. So far, only one of these products has been announced: Data General unveiled its AOS/VS Decision Connection last February.

Despite the entrance of third-party bridge products into the market, some major hardware manufacturers prefer to develop links into DISOSS and other environments on their own. In July, for example, DEC took the wraps off a DISOSS option for its All-in-1 office software. Called EDE (External Document Exchange) with DISOSS, this bridge translates revisable and final form documents stored in an IBM host library into revisable form WPS-PLUS and DECdx VAX/VMS documents. Similarly, documents can be created on DEC systems, transformed into IBM final or revisable form DCA DISOSS documents, and then filed into an IBM host document library. EDE with DISOSS complements DEC's DISOSS Document Exchange Facility, which was introduced last fall and enables users on a DECnet network to read but not revise DISOSS documents. The new DEC software is priced between $3,000 and $4,500, depending on the VAX system configuration.

DEC has not precluded the use of outside software houses. "We expect to develop many more exchange products and will look for the best alternative to connect to other vendors," says a DEC spokeswoman. "If that solution comes from a third party, we'll certainly look at it."

Correspondingly, Hewlett-Packard is doing all the work for a DISOSS link to its HP Desk Manager office system, which runs on the HP 3000. "We expect to achieve full LU 6.2 implementation by the end of 1986," says David Townsend, marketing manager for HP's Office Productivity Division in Tinewood, England, where the bridge is being built. The firm is enlisting the aid of a major British software house, however, to devise a link between IBM's PROFS and Desk Manager. Hewlett-Packard already has links to Wang's OIS and Telex systems and points to its agreement with Cullinet as further evidence of its interest in connecting with others, regardless of where the ties are fashioned.

FORGIONE OF DATA GENERAL: CEO-DISOSS link—a "strategic product" for the company.

PREFER TO DEVELOP IN-HOUSE

Other firms say up front that they prefer to develop their own connections. Data General announced in April that it would build a DISOSS link to CEO, its office software, and last month unveiled the CEO Document Exchange Architecture (DXA).

"We're developing it internally because we consider it to be a strategic product," says the company's Forgione. "It had to be integrated with our office software. In the long term, we believe we're in a better position to support the product if we develop it ourselves. It may take a little longer, but we think we'll have a better product."

Data General is also evaluating a CEO-to-PROFS product that, if offered, will be developed in-house as well. The company has already devised document exchange schemes between CEO and Wang's OIS and MCI Mail, among others.

Though Wang, AT&T, and others have relied heavily on outside software houses, the courses taken by DEC, Hewlett-

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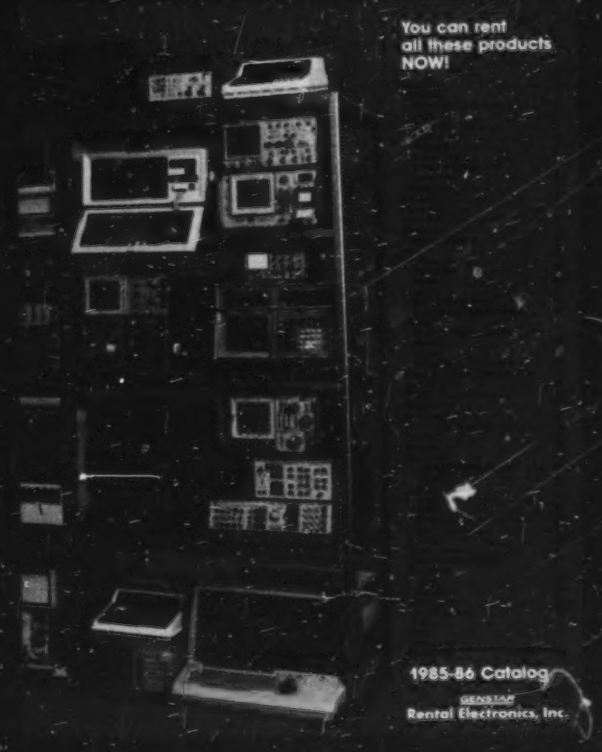

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Packard, and Data General support the view of some industry observers that those in the third-party bridge business are in their heyday right now. "These companies exist today because of the chaos that is present in the offices of major accounts," says a manager for one hardware maker. "But what will happen to them over the next few years as manufacturers adopt standards such as DIA, DCA, and the [International Standards Organization's] Open Systems Interconnection model? They're trying to secure their future by oeming to us now when bridges are necessities while we work toward standards."

When asked whether they worry about the loss of business or competition from their oems, the third-party companies reply that their business goes beyond DISOSS links, and even translation software. "We're in the office automation interconnect business," says Zisman of Soft-Switch. "We provide IBM mainframe applications in the OA environment." Adds the company's Fisher, "Plain text, revisable document exchange with DISOSS is what the market is focusing on today. Sure, there are some limitations to the product life cycle in this field. We recognize that and we have an active R&D effort. We're working on developing a whole range of compound document exchange products and on bridges that will tie private electronic mail systems to public systems."

"No vendor, whether it's IBM or DEC or Wang, is going to want to build something that is going to help the other," reasons Valvo of SRC. "AT&T is the only supplier we can think of that would consider doing that." Adds the firm's Mazuy, "We wouldn't be so presumptuous as to compete with IBM or AT&T. We add value to what they are doing."

Further, the trend—now from Apple down through the alphabet of vendors—is to buy components from third parties, notes CSI's Czubek. "The cost of development and the compressed life cycles of these products make reinventing the wheel unreasonable." DISOSS and other links, he argues, "are like operating systems—they're something hardware manufactures need, but they aren't unique." While DEC is in the lead among mini makers with EDE with DISOSS, Wang, Hewlett-Packard, Data General, AT&T, and others have some distance to go.

Oem sales also may go well beyond traditional computer vendors in this broad, horizontal field, Czubek suggests. "With these OA products, we're starting to get into markets we were never concerned about before. Now, anyone with anything that exists in the office and needs to communicate with the mainframe is a prospective client." ◉

Reprints of this article may be obtained by calling Suzanne Tecza, (212) 605-9731.

CIRCLE 76 ON READER CARD

As the economy slips gears, so do pay increases.

1985 DP SALARY SURVEY

With the national economy sputtering and occasionally stalling, salaries in the data processing business are growing, but not quite as fast as last year. Then, with economic growth a bit more robust, the average dp salary in the U.S. rose 7.3% over 1983's level. But this year's paychecks promise to be only 7.1% fatter than 1984's.

That's the main finding of the 1985 DATAMATION Salary Survey, which paid particular attention to perquisites and benefits offered to dpers of all ranks. Perks remain strong additions to the take-home pay of most managers, analysts, and programmers this year and are expected to retain their importance in years to come. For the first time, this year's survey takes a look at telecommunications salaries, an area that is sure to become increasingly important.

While dp becomes more important to business each day, so do the salaries paid to its practitioners. But indications are that in efforts to keep down labor costs, tighter controls are being placed on wages and benefits.

The slowing of growth in average salaries this year as compared with last was found in just about all metropolitan areas across the country. Rises were found in Los Angeles, where average salaries were found to be up 9.7% this year, compared to 9.0% in 1984, and in the economically robust areas of Boston, Manhattan, Philadelphia, Cleveland, Detroit, and San Francisco. According to the survey, workers in the areas of Seattle, Minneapolis/St. Paul, and Detroit see the smallest salary increases, perhaps because their local industries are not as healthy as those elsewhere.

For instance, a senior systems analyst in the New York metropolitan area, which excludes Manhattan, was found to be making an average of $38,000, while the same job category in Dallas/Fort Worth came in at only $31,960. In Boston, the figure was $30,250.

Evidently, inflation has been put under control—it is now estimated to be only 5% annually by the Conference Board, a New York business services organization—and that has helped senior management justify lower pay increases for dp and other professional staffs. Moreover, says the board, "Pressures springing from intense competition will continue to force companies to emphasize efficiency drives throughout 1985, which will keep the brakes on compensation gains." Even computer professionals, expected by some last year to enjoy double-digit pay increases as their importance was further recognized by management, will have to settle for less than might earlier have been hoped.

When looked at in terms of industry sector, the 1985 salary increases were expected to be highest in the distribution and edp services sectors (9.1% and 8.8%, respectively), reflecting the strength of those two sectors as a whole. Moreover, edp service firms tend to employ top-level personnel who, because they are specialists, can command high salaries. The slowest moving salaries will be seen in government and transportation/utility sectors, according to the survey; the increases there were rated at only 4.7% and 5.5%, respectively.

In general, negotiated pay raises have been low in recent years, according to statistics compiled by the Department of Labor. Whereas raises were 7.9% in 1981, they fell to 3.6% the next year, and were down to only 2.3% in 1984. Nevertheless, the growth of dp professional staffs, firmly rooted in the high-technology phenomenon, continues. The Data Processing Management Association of Park Ridge, Ill., found early this year that 42% of its members worldwide planned to boost their staff size this year while 54% said they would

ILLUSTRATION BY RICHARD EGIELSKI

Perks remain strong additions to take-home pay.

maintain current size. On average, DPMA found that 6.5 individuals would be hired at each member site, with an average of 3.5 of those professionals hired to fill new positions and the three others recruited to fill vacancies. As might be expected during the ongoing applications crush, a large portion (40%) of those being hired were programmers, after which came systems analysts. Personnel budgets, the DPMA survey found, comprise two fifths of the annual dp budget. Those budgets averaged $2.1 million and represented, on average, 6.5% of total corporate revenues.

BIG SHOP MEANS BIG PAYCHECK

Not surprisingly, the bigger the dp shop, the bigger the paycheck one can expect in every job category. This year's survey divided the dp shop spectrum into those that spend more than $1 million a year and those that spend less.

The differences in pay between those two categories can be quite pronounced. The typical dp vice president in the small shop was found to be earning a base salary of $51,272, while the veep in a larger shop brought home $66,089. The manager of operating systems programming could be making over $42,000 on average in a large organization, while the same job in a submegabuck shop would bring in only just over $34,000.

The reason for this discrepancy between pay in small and large dp shops has to do more with varying requirements of technical sophistication than with the mere number of dollars available for salaries. Large shops tend to have the most complex telecommunications networks, database structures, and operating systems environments, all of which need careful nurturing. No doubt some small shops are technically sophisticated, but many are still essentially batch processing operations.

For all managerial slots measured by the survey, the years of dp experience are double digit. The typical dp vice president, for instance, has 13 years under his or her belt, while the director of dp or MIS has 15.2 years. The manager of systems analysis/programming has an average of 11.8 years of experience while the manager of computer operations ranks in at 12 years. The low person on the totem pole, the junior applications programmer, has an average of 1.9 years at work, while the junior systems analyst/programmer has only 1.8 years.

Concurrent with the slight dip in growth rate of overall salaries is a decline in the turnover rate of professional staff. In both systems development and operations, survey respondents indicated that fewer job positions need filling. As the national economy's growth slows, people apparently change jobs less frequently. While respondents said that last year their lineups saw an overall change of 11%, this year's figure is down to 9.7%. Whether or not that dip in the turnover rate is a momentary one or permanent is a matter of speculation.

Says Joan Bernstein, manager of dp at Robert Half International, a nationwide recruiting firm based in New York, "Most of the movement is people moving from one career to another. While we're seeing a downturn for many of those people working in computer vendors hurt by the recent slump, others in healthy industries can make good increases by moving from company to company. We've seen companies fighting over people, throwing perks at them left and right."

Bernstein notes that as the size of on-line databases grows, demand grows for specialists in fourth generation languages, micro-to-mainframe links, and various forms of telecommunications. The latter, she says, command salaries that are "astronomical. People go the route for the person they want," she states, noting that signing bonuses is not uncommon as a lure to particularly sought after individuals.

Data communications managers and analysts are, in fact, increasingly part of the overall dp structure in large corporations as organizations move to on-line transaction processing systems, distributed processing networks, and other forms of computing that require machines to be connected over long distances. It is easy to foresee the day when telecommunications becomes merged completely into the management information system infrastructure, with reporting lines running directly into the highest echelons of dp management. For now, however, only partial samples of

SURVEY METHOD

The 1985 DATAMATION salary survey began in June with a letter sent to 5,000 dp officials in the United States, drawn at random from the magazine's list of 60,000 top managers at computer sites throughout the country. Enclosed with the letter was a four-page questionnaire and a token financial incentive.

A total of 589 key officials returned completed questionnaires, providing information on salaries, benefits, and perquisites for 45 discrete dp positions in various industries and metropolitan areas.

Information was also collected on work experience, annual dp budgets, and turnover rates, among other factors. About three fifths of the respondents described themselves as dp managers.

As shown in the accompanying tables, the most important labor pools covered by the survey were those in Boston, New York (divided into Manhattan and its environs), Philadelphia, Washington/Baltimore, Atlanta, Denver, Houston, Dallas/Ft. Worth, Chicago, Minneapolis/St. Paul, Cleveland, Cincinnati/Columbus, Detroit, St. Louis, Seattle, San Francisco/Silicon Valley, and Los Angeles. The salary and other data were also broken down by industry category.

Most of the dp shops responding to the survey listed their annual budgets as less than $1 million. The average number of full-time dp professionals employed at each shop this year is 19.2, up from 18 in last year's survey. The number of temporary employees this year is 7.1, compared with 4.8 last year.

In terms of industry category, the largest representation in this year's survey came from 66 consumer and 93 industrial manufacturing companies (a combined share of 27% of the respondents), followed by 62 edp services and 62 educational (10.5% each) sites.

FIG. 1

ANNUAL SALARY INCREASES

(IN PERCENT)

	1984	1985
Boston	7.6	7.9
Manhattan	8.1	9.9
NYC Metro	7.8	7.2
Philadelphia	6.7	7.4
Wash./Balt.	7.6	7.2
Atlanta	7.7	7.2
Denver	7.5	6.3
Houston	7.3	6.9
Dallas/Fort Worth	8.4	6.4
Chicago	6.7	6.4
Minn./St. Paul	5.9	6.0
Cleveland	6.6	6.9
Cin./Col.	8.1	6.2
Detroit	5.7	6.0
St. Louis	5.6	6.9
Seattle	5.7	4.8
San Francisco	9.4	9.6
Los Angeles	9.0	9.7
Total Sample	7.3	7.1

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FIG. 2
BENEFITS AND PERQUISITES
(IN PERCENT)

	AVAILABLE		IF AVAILABLE, TO	
	YES	NO	MGMT ONLY	MGMT & STAFF
Medical	96.9	1.9	2.2	86.1
Dental	61.8	30.4	1.7	54.7
Disability	85.9	9.0	5.9	72.8
Life Insurance	90.3	6.5	7.0	75.9
Paid Vacation	96.4	1.9	1.7	85.9
Overtime	60.4	29.9	1.4	34.3
Profit Sharing	37.2	48.2	9.7	25.3
Investment Plan	33.3	49.1	3.4	27.7
Stock Options	21.2	59.2	13.1	7.6
Stock Discount	10.0	67.1	2.2	7.3
Pension	67.7	22.9	3.1	58.2
Signing Bonus	9.8	66.4	5.6	3.9
Longevity Bonus	13.8	66.2	3.1	9.2
Club Membership	14.6	65.2	10.5	3.4
Recreational Facilities	14.8	65.7	2.2	11.2
Automobile	30.1	53.7	26.0	3.2

FIG. 3
TURNOVER RATES FOR PROFESSIONAL STAFF
(IN PERCENT)

	DEVELOPMENTAL		OPERATIONS		OVERALL	
	1984	1985	1984	1985	1984	1985
Boston	14.5	7.8	4.2	14.3	7.3	8.8
Manhattan	18.8	13.3	10.0	24.6	25.5	24.8
NYC Metro	12.3	8.4	9.9	7.3	13.5	10.4
Philadelphia	4.3	8.3	7.5	4.1	7.3	5.3
Wash./Balt.	6.5	9.3	7.5	7.0	8.8	11.8
Atlanta	8.5	6.8	8.2	3.8	7.3	9.2
Denver	4.2	4.8	5.5	7.3	8.4	9.1
Houston	8.3	10.0	11.2	13.3	12.2	13.3
Dallas/Fort Worth	21.9	11.4	14.3	20.4	22.1	17.3
Chicago	11.2	7.4	9.0	4.9	13.3	7.7
Minn./St. Paul	7.6	15.0	18.9	11.1	15.9	14.0
Cleveland	7.2	7.6	3.7	4.7	10.8	4.7
Cin./Col.	8.3	6.3	3.8	8.5	8.2	11.1
Detroit	11.4	22.5	3.5	6.5	4.5	14.1
St. Louis	13.6	5.5	1.1	0.8	7.5	6.9
Seattle	16.6	7.7	9.0	7.3	12.4	8.0
San Francisco	13.8	7.6	11.4	5.5	12.3	6.6
Los Angeles	13.0	9.1	11.7	7.3	8.6	7.2
Total Sample	10.7	8.5	9.3	7.9	11.0	9.7

telecom salary data are available; apparently, in many industrial sectors there is a strong enough delineation between telecom and dp to keep the latter's management from knowing too much about how well the former is paid.

In those sectors that did report on telecom, the telecom manager was found to have an average base salary of $42,322. The range of salaries for the post was measured as running from $32,600 in Seattle to $70,000 in Philadelphia. The average salary for telecom analysts was put at about $28,300, with those in manufacturing and services evidently bringing in the biggest bucks. Says Bernstein at Robert Half, "People who know VTAM [an IBM telecommunications system] are in particular demand these days."

With the AT&T divestiture and increased competition from IBM and others having fragmented the telecom market immeasurably, it is not surprising to find knowledgeable persons in such demand.

FIG. 4

AVERAGE SALARY BY INDUSTRY

(IN $)

	ALL	CONSUM MFG	INDUS MFG	BANK	FINAN	EDP SERV	OTHER SERV
CORPORATE STAFF							
Vice President	56,519	63,750	54,375	53,125	57,091	54,482	60,800
Director of Dp/MIS	44,647	44,293	46,599	39,134	53,273	45,385	48,857
Services Coordination/User Liaison Dir.	35,406	27,000	40,256	37,000	41,500	36,711	67,500
Information Center Director	41,960	33,500	43,494	34,405	46,200	44,755	52,000
Director of Security	34,334	NA	40,944	45,000	37,500	31,800	44,000
SYSTEMS ANALYSIS							
Manager	40,312	40,625	39,068	25,000	36,000	44,900	43,167
Senior Systems Analyst	34,910	33,654	35,180	37,509	32,000	36,597	36,700
Lead Systems Analyst	32,775	26,000	38,431	43,980	21,586	30,857	41,500
Systems Analyst	28,730	28,200	31,090	36,386	30,000	27,922	29,540
Junior Systems Analyst	25,121	16,500	23,616	22,002	28,000	23,000	25,800
APPLICATIONS PROGRAMMING							
Manager	39,889	42,667	41,848	27,000	35,750	42,900	43,460
Lead Application Programmer	32,420	31,071	38,389	24,500	34,000	34,001	37,800
Senior Application Programmer	28,730	27,352	30,140	32,505	28,500	27,320	33,700
Application Programmer	23,218	23,488	24,068	19,667	22,864	24,682	24,575
Intermediate Application Programmer	22,597	23,258	24,663	20,920	18,067	22,170	21,375
Junior Application Programmer	19,498	17,750	20,809	17,483	17,650	19,754	22,375
SYSTEMS ANALYSIS/PROGRAMMING							
Manager	39,820	37,816	39,615	49,028	39,834	43,606	45,682
Lead Systems Analyst/Programmer	34,891	35,165	32,254	42,829	34,000	38,750	35,416
Senior Systems Analyst/Programmer	31,523	30,439	30,655	23,755	32,588	34,051	32,865
Systems Analyst/Programmer	26,856	27,383	26,968	25,500	25,760	27,997	27,369
Intermed. Systems Analyst/Programmer	24,201	24,412	23,301	23,333	25,000	26,539	22,667
Junior Systems Analyst/Programmer	20,602	19,283	21,054	21,000	21,750	21,433	21,093
OPERATING SYSTEMS PROGRAMMING							
Manager	40,109	40,243	40,040	37,825	40,869	45,685	47,650
Senior Systems Programmer	35,416	35,600	36,003	33,893	34,600	39,680	41,171
Intermediate Systems Programmer	28,397	27,000	28,756	32,964	25,300	30,431	31,763
Junior Systems Programmer	21,687	19,100	24,719	NA	23,607	27,550	24,533
DATABASE ADMINISTRATION							
Manager	38,825	38,000	38,921	41,003	38,000	43,110	40,000
Database Administrator	31,827	32,333	32,849	37,290	29,850	34,894	32,500
DATACOM/TELECOM							
Manager	42,322	NA	47,611	47,748	47,670	37,467	75,000
Analyst	28,307	28,375	33,312	22,446	33,434	26,383	45,000
COMPUTER OPERATIONS							
Manager	30,364	32,191	32,401	26,590	32,857	34,504	31,529
Shift Supervisor	23,580	25,456	27,274	17,590	22,866	23,591	26,350
Lead Computer Operator	19,326	18,256	20,505	15,683	19,587	18,783	20,781
Computer Operator	15,960	15,601	15,647	12,657	19,286	17,256	15,459
Magnetic Media Librarian	17,115	22,125	15,808	11,000	15,121	14,325	18,888
PRODUCTION AND i/O CONTROL							
Supervisor	24,872	24,313	23,303	21,956	23,300	27,006	25,000
Lead Production Controller	20,134	22,500	20,850	NA	16,500	24,683	18,500
Scheduler	20,134	20,313	17,767	21,465	18,333	20,000	19,600
Control Clerk	16,611	16,798	13,813	14,058	14,420	15,662	13,250
DATA ENTRY							
Supervisor	17,606	18,900	18,444	12,855	17,231	16,934	18,400
Operator	14,374	13,948	14,287	10,870	12,701	12,990	13,386
OFFICE AUTOMATION							
Word Processing Supervisor	19,478	16,000	16,933	16,835	18,250	22,833	18,036
Word Processing Operator	14,592	13,900	14,200	12,767	13,738	15,287	16,000
Micro. User Services Specialist	23,135	21,000	24,175	11,440	32,500	21,312	NA
Documentation Specialists	20,691	16,333	18,250	21,118	21,025	23,405	19,599

NA: not available

DISTRB	GOV'T	MED/ LEGAL	TRANS/ UTIL	EDUCA	ANNUAL SPENDING < $1M	ANNUAL SPENDING > $1M
49,833	60,000	47,667	85,000	52,000	51,272	66,089
42,079	41,656	46,703	45,600	40,101	39,779	54,144
38,000	42,072	20,000	NA	29,417	32,436	38,933
35,900	41,877	41,333	NA	36,950	35,047	45,416
30,000	31,949	NA	NA	NA	33,333	34,565
35,063	41,631	35,256	NA	34,500	37,409	44,416
27,250	37,215	34,200	31,611	30,550	33,925	36,388
28,500	34,511	34,000	32,600	23,667	32,504	33,452
28,500	28,045	32,800	32,000	24,328	27,768	29,828
20,175	28,589	30,600	23,400	18,250	22,905	27,593
30,887	40,120	44,600	31,130	37,553	34,659	42,839
26,000	33,635	32,578	NA	28,311	30,793	33,784
23,833	30,841	27,960	21,400	27,698	27,489	30,023
21,000	25,714	21,954	21,887	20,815	22,369	24,455
19,200	24,394	27,333	21,000	19,881	21,063	23,701
18,17-	19,615	13,814	19,450	17,121	18,530	20,963
36,778	39,057	36,570	38,757	36,037	34,696	44,498
28,000	36,440	33,809	38,250	29,997	31,728	37,593
31,313	31,247	31,840	33,167	29,076	29,598	33,443
28,294	27,983	26,833	27,309	24,400	25,681	28,479
19,200	26,345	24,398	25,900	23,821	22,617	25,666
22,883	21,509	17,750	22,450	19,420	19,569	21,539
33,980	40,752	39,372	38,045	34,760	34,480	42,298
30,600	38,144	33,967	32,267	31,516	34,627	35,822
29,000	30,725	30,000	29,168	23,853	26,348	29,335
20,000	20,812	23,708	18,500	20,044	20,822	22,279
36,300	35,927	39,500	NA	36,633	33,700	40,608
29,333	27,445	30,447	35,500	27,167	28,764	31,943
25,000	39,375	33,000	NA	35,819	30,767	42,602
19,667	29,668	31,000	NA	22,837	24,750	28,329
28,004	29,757	28,867	30,046	27,683	27,219	33,858
20,231	27,034	24,174	NA	20,396	20,535	24,853
18,762	20,708	19,599	25,052	18,288	18,224	20,684
15,109	17,407	15,902	18,665	15,572	15,412	16,976
14,000	16,075	20,000	13,500	16,151	20,027	16,512
19,728	30,744	24,840	23,000	24,672	22,210	26,417
13,333	20,935	20,667	NA	19,866	18,677	20,893
NA	19,857	18,837	24,400	18,945	17,000	20,616
12,203	17,242	17,014	17,996	15,986	15,941	17,086
16,650	17,123	17,582	22,733	19,681	16,624	18,842
15,401	14,621	13,461	16,689	14,134	14,004	15,269
16,500	18,344	21,100	NA	19,484	18,148	21,091
12,163	15,393	17,887	16,700	13,070	14,275	15,162
16,500	25,980	17,000	33,970	19,342	22,712	23,364
12,500	19,731	16,532	15,550	26,488	19,558	21,543

Users have to put together their own networks by writing software and choosing hardware, and have to manage those networks from terminal to front-end processor to mainframe. In fact, some former AT&T engineers and managers have been welcomed into the user community, which needs their expertise more than ever.

Another area in which expertise is rare but demand growing is so-called artificial intelligence, which calls for special programming skills that are only now becoming available in number. While there isn't a great deal of AI work going on in corporations, interest is beginning to blossom and so-called "knowledge engineers" are finding their services needed by organizations that hope to capture a human expert's special knowledge and "clone" it in what are known as knowledge-based systems. Bernstein says she has seen some demand for this type of person from insurance companies, banks, and other financial institutions.

PERKS IMPORTANT AS EVER

Perquisites are as important as ever to dpers, the most common ones being medical coverage and paid vacations, followed by disability and life insurance and pensions. Stock options, profit sharing, and automobiles, three other popular perks, are offered more to management than to staff, as might be expected. In many cases, perks are used judiciously to lure candidates into a company and then keep them there for as long as possible. Despite the limitations of the economy, the shift of personnel from company to company continues, with the brighter lights seeking their fortune wherever it takes them.

While in past surveys the strongest turnover rates were experienced in Sunbelt cities, where general economic health was often better than in the Northeast and on the West Coast, this year the strongest rates were found in other areas. For instance, the turnover rate in Manhattan was 24.8% and in Detroit 14.1%. At the low end of the turnover spectrum were Philadelphia at 5.3% and Cleveland at 4.7%.

Some analysts predict that the dp hiring picture will get better in the second half of the year. The CompuSearch division of Management Recruiters International Inc., Cleveland, found that just over two fifths of the several hundred companies it surveyed earlier this year would increase their staffs by the end of the year, up a few points from the number recorded in late 1984 for the year's first half. Only 7% of those surveyed by CompuSearch indicated a decrease of staff for 1985.

A survey taken last year by the As-

FIG. 5

AVERAGE SALARY BY REGION

(IN $)

TITLE	ALL	BOSTON	MANHAT	NYC AREA	PHILA	WASH/ BALT	ATLANTA
CORPORATE STAFF							
Vice President	56,519	58,929	95,000	61,875	44,000	61,240	55,819
Director of Dp/MIS	44,647	43,625	57,750	46,345	41,638	48,093	42,388
Services Coord./User Liaison Dir.	35,406	26,667	NA	38,500	27,000	52,262	30,000
Information Center Director	41,960	39,000	NA	40,500	NA	49,066	31,500
Director of Security	34,334	30,000	NA	NA	NA	NA	NA
SYSTEMS ANALYSIS							
Manager	40,312	41,286	35,000	42,305	33,250	36,063	39,833
Senior Systems Analyst	34,910	30,250	NA	37,973	28,000	36,750	34,333
Lead Systems Analyst	32,775	22,000	NA	43,500	29,500	41,000	32,167
Systems Analyst	28,730	30,500	NA	32,286	26,333	28,125	28,500
Junior Systems Analyst	25,121	NA	NA	25,000	22,000	24,000	23,667
APPLICATIONS PROGRAMMING							
Manager	39,889	36,950	NA	44,900	26,750	39,000	41,767
Lead Application Programmer	32,420	29,879	NA	30,429	38,000	35,333	31,194
Senior Application Programmer	28,730	27,500	NA	28,918	28,667	28,267	25,840
Application Programmer	23,218	21,033	NA	24,239	23,076	23,107	22,500
Intermed. Application Programmer	22,597	20,175	NA	22,823	NA	23,500	24,333
Junior Application Programmer	19,498	17,720	NA	17,500	20,750	17,643	18,763
SYSTEMS ANALYSIS/PROGRAMMING							
Manager	39,820	43,200	45,000	40,583	41,468	37,289	38,200
Lead Systems Analyst/Programmer	34,891	34,600	NA	39,200	32,497	34,363	31,400
Senior Syst. Analyst/Programmer	31,523	28,100	34,667	32,347	32,080	28,742	30,060
Systems Analyst/Programmer	26,856	31,079	28,000	25,514	29,994	26,333	27,750
Intermed. Systems Analyst/Program.	24,201	26,833	NA	25,713	25,120	25,625	30,000
Junior Systems Analyst/Program.	20,602	21,857	NA	22,384	22,600	17,000	20,750
OPERATING SYSTEMS PROGRAMMING							
Manager	40,109	39,833	50,000	44,367	32,475	42,636	40,600
Senior Systems Programmer	35,416	36,120	NA	42,044	30,550	36,683	33,429
Intermediate Systems Programmer	28,397	27,000	27,000	31,798	26,500	29,040	29,080
Junior Systems Programmer	21,687	24,767	NA	29,600	NA	NA	24,160
DATABASE ADMINISTRATION							
Manager	38,825	NA	NA	42,483	NA	39,715	35,875
Database Administrator	31,827	42,051	NA	40,750	44,000	28,500	30,540
DATACOM/TELECOM							
Manager	42,322	NA	NA	41,223	70,000	38,754	40,000
Analyst	28,307	32,500	NA	27,905	34,500	30,000	31,025
COMPUTER OPERATIONS							
Manager	30,364	33,608	31,467	34,738	27,364	31,438	25,171
Shift Supervisor	23,580	24,010	23,750	24,360	20,000	30,592	19,167
Lead Computer Operator	19,326	20,267	22,000	21,383	18,571	18,986	17,330
Computer Operator	15,960	16,842	19,000	17,136	14,310	16,220	14,511
Magnetic Media Librarian	17,115	15,500	20,000	21,026	NA	18,000	12,000
PRODUCTION AND I/O CONTROL							
Supervisor	24,872	21,413	30,000	22,657	17,500	36,815	23,500
Lead Production Controller	20,134	25,000	NA	16,650	NA	25,810	15,000
Scheduler	20,134	15,250	NA	25,800	NA	26,381	12,950
Control Clerk	16,611	16,899	20,000	16,409	15,311	18,652	13,698
DATA ENTRY							
Supervisor	17,606	19,200	NA	18,655	13,533	19,414	13,857
Operator	14,374	14,203	16,000	14,263	11,615	13,920	11,977
OFFICE AUTOMATION							
Word Processing Supervisor	19,478	NA	NA	24,200	17,500	19,979	25,000
Word Processing Operator	14,592	15,566	13,000	14,255	10,000	16,599	15,500
Micro. User Services Specialist	23,135	20,250	NA	20,110	27,000	33,286	20,000
Documentation Specialists	20,691	17,798	NA	22,167	20,000	23,474	16,725

DENVER	HOUS-TON	DALLAS	CHI	MINN/ ST. PL	CLEVE	CIN/ COL	DTRT	ST. LOU	SEATL	SAN FRAN	LOS ANGEL
52,000	NA	42,500	50,250	53,100	54,700	59,833	NA	36,000	54,875	66,831	59,524
48,143	44,685	51,227	47,286	36,842	47,400	49,448	43,420	42,657	41,763	51,672	48,206
18,000	67,500	NA	NA	46,000	50,688	NA	32,000	35,934	33,500	43,500	51,500
NA	NA	NA	38,333	NA	51,132	45,525	45,400	47,976	40,000	32,456	33,780
NA	NA	NA	NA	NA	45,000	NA	44,000	40,944	31,459	45,000	33,007
39,250	51,250	41,850	37,167	40,783	48,500	41,874	34,000	43,159	37,016	44,200	44,885
35,500	30,000	31,960	30,780	32,150	36,500	37,764	NA	33,436	34,966	37,375	39,686
NA	32,000	30,000	NA	33,667	36,500	29,240	18,172	35,443	34,444	32,333	45,000
30,000	26,750	26,333	27,367	31,167	28,000	28,067	30,500	30,343	25,424	31,000	30,064
20,500	NA	21,500	23,000	20,000	29,000	20,200	NA	29,332	27,000	27,000	23,500
39,667	46,300	36,825	49,650	42,000	NA	45,900	38,000	44,738	37,706	47,416	31,667
34,500	NA	31,217	33,571	36,475	29,000	39,910	NA	36,972	30,576	41,200	32,750
32,000	31,467	31,428	27,086	27,545	27,000	26,110	NA	30,672	28,576	39,077	32,919
25,820	27,100	25,000	26,461	20,663	22,096	21,133	21,300	22,054	22,597	28,912	25,068
27,000	NA	20,500	23,889	18,350	21,160	21,000	NA	26,463	22,445	30,673	22,914
16,800	19,200	20,167	19,714	19,500	17,500	16,833	NA	22,405	19,000	23,105	19,326
39,446	50,500	39,643	40,240	37,333	40,137	41,352	40,000	30,567	41,350	45,385	40,099
NA	50,400	35,000	38,000	NA	39,612	33,353	NA	22,250	32,042	40,409	40,033
33,300	34,200	31,200	35,750	34,200	33,187	29,023	26,075	25,500	31,310	38,800	38,960
25,875	33,163	27,333	25,500	26,083	27,487	24,617	22,875	26,000	25,963	29,194	30,587
33,000	24,500	24,000	24,333	21,150	23,139	20,417	NA	22,000	24,561	28,000	28,419
24,000	NA	20,000	19,167	NA	22,000	22,183	20,000	19,000	21,494	20,333	22,828
40,492	50,500	40,000	42,000	30,000	43,008	44,360	37,000	47,436	37,942	43,971	36,308
39,500	43,850	30,500	32,729	37,200	37,284	28,525	32,000	36,772	36,700	31,296	40,196
NA	36,300	30,000	27,620	23,200	26,142	26,507	26,500	33,780	25,257	30,457	33,802
22,912	22,600	NA	NA	NA	15,000	17,950	NA	19,173	18,000	27,420	29,600
36,000	NA	36,000	35,865	NA	40,000	45,910	40,000	35,222	39,600	32,000	43,986
39,500	NA	27,500	29,750	35,000	27,872	31,587	NA	30,312	33,600	22,000	33,000
NA	NA	NA	36,500	NA	46,150	44,910	NA	35,424	32,610	51,331	18,000
45,000	NA	NA	27,313	23,875	30,000	28,587	NA	28,560	23,949	25,470	30,333
30,800	26,000	28,120	33,933	33,028	34,400	33,450	26,700	24,321	31,845	29,810	31,617
NA	NA	20,175	23,661	26,500	27,521	34,320	16,025	26,346	27,408	26,000	22,510
20,257	18,550	18,083	20,437	21,630	19,690	19,421	19,250	16,525	20,388	20,147	21,561
16,074	18,794	16,238	14,891	16,557	14,477	15,582	16,363	14,083	18,404	15,948	17,843
NA	23,150	15,000	14,464	13,060	20,180	13,450	NA	15,506	14,117	NA	21,000
25,000	NA	16,000	24,310	24,950	35,000	25,000	NA	26,912	25,200	33,913	24,803
19,000	NA	NA	17,000	20,000	22,000	NA	NA	22,600	24,120	22,340	19,810
18,000	NA	17,333	18,150	21,000	25,000	23,900	NA	18,000	21,074	19,896	15,600
NA	NA	14,000	12,739	17,130	14,467	15,320	NA	15,100	13,675	17,937	16,290
18,000	NA	14,860	16,340	17,833	20,000	22,732	17,600	16,500	18,159	17,858	19,044
14,087	14,900	14,305	13,003	14,640	13,225	13,874	20,411	12,851	17,311	16,029	14,860
15,000	18,500	18,000	19,333	12,500	18,400	19,500	18,400	NA	19,133	26,304	22,250
14,186	21,600	12,500	13,508	9,000	13,503	14,775	13,333	11,667	15,937	18,883	17,720
NA	NA	14,000	16,500	NA	27,024	15,780	21,000	21,000	20,660	42,750	NA
23,250	22,000	14,250	22,000	NA	26,000	15,750	NA	13,000	19,267	30,073	23,994

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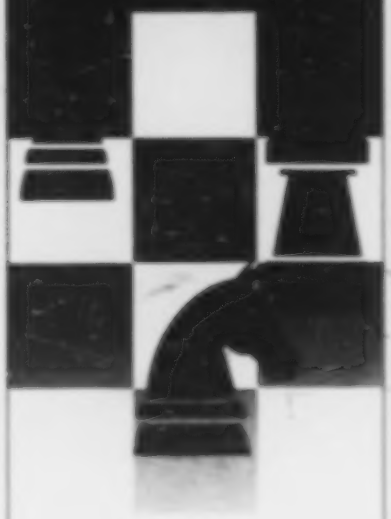

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JOB DESCRIPTION GUIDE

Respondents to the salary survey matched, as closely as possible, their staff categories to the following job descriptions.

Corporate staff: Reports to senior management within corporation.

Vice president: The senior executive for all corporate information systems. Responsible for long-range planning, budgeting, and operations.

Director of dp/MIS: In charge of all data processing at the divisional or departmental level. Responsibilities parallel those of corporate officers, but may be at least partially guided by decisions made at corporate level.

Services coordinator/user liaison director: Works for dp department and end users. Represents users when operational problems occur.

Information center director: Manages activities of information center, including choice of computing tools, end-user training, and in-house consulting services.

Director of security: Oversees security measures taken to secure data, systems, and physical premises.

(For the seniority levels in each of the following categories, refer to the section on job levels.)

Systems analysis: Confers with users to define and formulate logical statements of business problems and devise procedures for solutions through use of dp systems.

Applications programming: Develops, designs, prepares computer programs.

Systems analysis/programming: Performs the functions of both the systems analysis and applications programming posts.

Operating systems programming: Programs, maintains, and introduces modifications to systems software.

Database administration: Plans, organizes, and schedules the activities of the database section. Establishes standards and maintains data dictionary.

Data communications/telecommunications: Designs and develops data communications networks and oversees installation and operation of same.

Computer operations: In charge of equipment, data entry, production control, and post processing, but not of systems analysis, applications programming, or other development functions.

Production and I/O control: Sets up and schedules jobs for processing so as to maximize utilization and meet turnaround requirements.

Data-entry: Performs data entry and verification functions.

Office automation: Operates word processing equipment, electronic typewriters, and terminals for text editing. Includes microcomputer specialists, as well.

Documentation specialist: Writes, maintains and distributes documentation for systems generated in-house and purchased from without.

JOB LEVELS

Manager: Advanced degree and minimum five years' experience or equivalent combinations. Strong management skills, performs personnel evaluations, budgeting, progress reporting, and project management.

Lead: Bachelor's degree or equivalent and minimum four years' experience in dp with two of those years in a supervisory capacity. Performs all levels of supervision, generally as a project manager.

Senior: Bachelor's degree or equivalent, and minimum three years' experience, including some supervision.

Intermediate: Bachelor's degree or equivalent and minimum two years' experience. Requires direction on some activities.

Junior: Two to four years of college and minimum six months' experience or equivalent combination. Requires direct supervision.

sociation for Computer Operations Managers, based in Garden Grove, Calif., found that salaries for that type of job were keeping pace with the traditionally higher-paid programming manager. Data entry, data control, and computer operations salaries "are beginning to equalize," says a spokesman for the organization, claiming that computer operations is losing its second-place ranking and is being recognized for its importance.

"The top operations person is now at a much higher level in the data processing management hierarchy than in the past, which is bolstering professional credibility for operations management," the spokesman says, noting that operations managers bring in average salaries of about $40,000. ●